THE LOG OF THE LAB

Items of Current Research

FOREST PRODUCTS LABORATORY* FOREST SERVICE
U. S. DEPARTMENT OF AGRICULTURE

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To our friends everywhere, the Forest Products Laboratory extends cordial greetings and best wishes for a New Year of welfare and progress. To improve the utility and increase the marketability of forest products is the purpose of our research, to the end that our present and future forest supply may fulfill its greatest function in the economic and social life of the Nation. May this be a year of continued mutual endeavor toward that ideal.

CARLILE P. WINSLOW
Director.

FLOORS OF MANY WOODS

THE WIDE CHOICE of woods for flooring available to the home builder or remodeller is factually demonstrated by 30 floors recently laid at the Forest Products Laboratory. This job is in accord with plans announced two years back, to feature a variety of American woods in the trim and finish of the fireproof Laboratory building.

The materials in the new floors range from straight-grained quarter-sawed western hemlock laid in conventional lengths to 8-inch built-up squares of walnut remanufactured from war-time gunstock blanks. One bank of offices is floored herringbone style with a series of distinctive hardwoods including pecan, cherry, red gum, tupelo gum, black gum, white ash, sycamore, beech, birch, and several varieties and combinations of maple. Other floors feature oak in units of different types – full-length quarter-sawed strips, built-up squares, long panels made up of transverse short lengths, and heavy plywood boards in random widths resembling old-fashioned puncheons. Three rooms have end-grain floorings of pine blocks, redwood blocks, and laminated pine plywood respectively.

The methods of manufacturing the various composite units included gluing, dowelling, and the use of metal splines. Both hot and cold mastics were used in laying the block and herringbone floors. Some of the strip floors were fastened by special clips secured to steel channels. Great care was taken to insure proper dryness of the wood at the time of laying, so as to minimize shrinkage and cracking of the floors in service.

* *Maintained at Madison, Wis., in cooperation with the University of Wisconsin*

Three main types of flooring are now in place in the Laboratory as a whole – wood, including the original parquetry of oak, maple, and walnut covering the main lobby, pressed wood fiber tile, and linoleum. The last-named comes very appropriately into the forest products family because of its large content of cork, wood flour, and forest-produced resins and oils. For finishing the different floors standard varnishes, bakelite varnishes, penetrating floor varnishes, and waxes were used.

EXPERIMENTS in chemical seasoning are adding a new and more effective technique in the drying of difficult woods. Successful work was recently done at the Forest Products Laboratory in the drying of southern swamp oaks, hitherto considered impossible of satisfactory seasoning because of their excessive checking, honeycombing, and warping. The method used was steeping in brine, followed by a high-temperature and low-humidity schedule in the dry kiln. By this means one-inch boards of swamp oak were processed and dried in two weeks to a moisture content as low as 5 percent, with no checking and with less shrinkage than when seasoned by ordinary methods. The rate of drying is about three times as fast as in the best current kiln-drying practice. Two office tables made from some of the treated oak are now giving service equal to the finest. Experiments are being extended to other species and larger sizes of stock and to treatments with various salts to secure fireproofing and decay resistance along with quick and effective drying.

SPRINGS OF QUARTZ

TO MEASURE the amount of moisture taken up by paper samples from an atmosphere of a certain exact humidity is a delicate weighing job that must be done without breaking into the humidity chamber and upsetting the whole object of the test. The best way is to keep a continuous weighing device at work in the chamber, and scientists have found that under the given conditions a coil spring of pure quartz is the best device for fine and dependable weighing. A quartz spring does not rust or corrode, and it always comes back just to the mark when the load is taken off. Tests show that loading for two years or more causes no permanent sag. For a substance that looks like glass, the quartz filament is remarkably tough.

Forest Products Laboratory workers now make their own quartz springs for determining moisture characteristics of the new papers they are developing from American woods. A quartz rod is heated in an oxygen blowpipe flame and is pulled out into a long thread. This thread is then coiled, under less severe heat, into a spring about 6 inches in length, and a hook is formed at each end. After its stretch under standard known loadings has been carefully determined, the spring is ready for business. It is suspended, carrying its sample scrap of paper, inside a window of the humidity chamber, and its lengthenings and shortenings with

changing moisture in the sample are accurately read by means of a cathetometer telescope mounted outside. Springs in use at the Laboratory are so sensitive that a change in weight of four one-millionths of an ounce can be easily measured.

WHITE OAK has long been the brewers' choice for beer barrels, but with the coming of repeal and the heavy demands already made on decreasing white oak resources, it was felt that some shifting of the burden should be attempted. Red oak, of which there is a large supply in both northern and southern stands, naturally suggested itself as an alternative wood. The problem was to overcome the effect of porosity in the red oaks, which allows free movement and escape of gases and liquids lengthwise through the wood. The Forest Products Laboratory's investigation of different means of plugging the pores showed that ordinary brewers' pitch could be made to serve the purpose satisfactorily, and simple means were devised for treating the interior of the barrel with the hot pitch under pressure. By this process red oak barrels were made fully as tight as those of white oak, and service tests by a large Milwaukee brewery of 20 red oak barrels so treated have demonstrated the practical success of the method. Widespread interest has been awakened in the possibilities of this new source of brewery cooperage.

A PLYWOOD BUILDING with glued arches is being erected for service and storage purposes on the grounds of the Forest Products Laboratory. Over 220 feet long, 46 feet in greatest width, it demonstrates the latest developments in wood unit construction. The outside wall panels are of plywood cemented with hot-pressed phenolic resin glue, which is particularly resistant to moisture damage. The main roof deck consists of glued unit panels of joist and plywood construction, efficiently combining strength with light weight. These are fastened to the arches with casein glue. Most of the arches are built up to heavy timber size by gluing together laminations $^{9}/_{16}$ inch thick. In this group are two arches of a new box-girder design with plywood webs and laminated flange members. In addition there are two trussed timber arches built up with metal connectors of a type recently introduced from Europe. All serve the purpose of providing plenty of supporting strength to insure a high, wide, unobstructed interior.

VISITORS are welcome at the Forest Products Laboratory. During the past year general visitors and those seeking technical information numbered 4567. This is not far below the total of 5200 who converged on the Laboratory in 1933, the first full year of operation in our new building.

Peak month for visitors in 1933, was August, when 918 arrived. The 1934 maximum, 748, was recorded in October. During the last fiscal year 45 States and 12 foreign countries were represented. A guide staff is in attendance to insure a satisfactory tour of the Laboratory.

LATE LABORATORY PUBLICATIONS

1. Research in Forest Products (1933 and 1934). Mimeographs describing recent work of the Forest Products Laboratory. Copies sent free on request.

2. U. S. D. A. Leaflet No. 83: More Turpentine, Less Scar, Better Pine. Free on request.

3. U. S. D. A. Circular No. 236: Design Factors Affecting the Strength and Rigidity of Wooden Crates. 5 cents.

4. U. S. D. A. Circular No. 239: Moisture Content of Wood in Dwellings. 5 cents.

5. U. S. D. A. Technical Bulletin No. 282: Strength-Moisture Relations for Wood. 20 cents.

6. U. S. D. A. Technical Bulletin No. 305: Strength and Related Properties of Redwood. 10 cents.

7. U. S. D. A. Technical Bulletin No. 332: The Bearing Strength of Wood Under Bolts. 5 cents.

8. U. S. D. A. Technical Bulletin No. 343: Specific Gravity and Related Properties of Softwood Lumber. 5 cents.

9. U. S. D. A. Technical Bulletin No. 375: Selective Logging in Shortleaf and Loblolly Pine of the Gulf States. 5 cents.

10. U. S. D. A. Technical Bulletin No. 408: Properties of White Fir and Their Relation to Manufacture and Uses. 10 cents.

11. U. S. D. A. Miscellaneous Publication No. 185: Guide to the Grading of Structural Timbers and the Determination of Working Stresses. 5 cents.

All the above items except the first two are to be obtained from the Superintendent of Documents, Government Printing Office Washington, D. C., at the prices stated (stamps not accepted).

DISCOVERY OF A "WET KILN"

Lumber going into building use should be dried no more and no less than enough to match the average moisture conditions that will surround it in service. Shrunken woodwork and flooring are the frequent penalty of neglecting this principle, when wood that is not dry enough is installed in heated buildings.

Perhaps less frequent is the case of wood too thoroughly dried when placed in service.

A clear example of the latter was observed recently when ceiling boards in the cooling room of a meat-packing plant swelled badly and buckled into troughs and ridges. Readings taken by a Forest Products Laboratory engineer over a period of three months showed that a very high relative humidity was present in the room at all times. The cooling chamber was, in effect, a low-temperature "wet kiln," and the wood, installed at a moisture content of probably 12 per cent and laid tight, picked up moisture to a total of 22 per cent. It was all swelled up with nowhere to go; hence the uprising. The Laboratory's recommendation in all cases is to find out how dry or how damp the service conditions will be, and then to obtain lumber properly seasoned to fit the conditions.

SAWDUST when treated with phenol by a process under development at the Forest Products Laboratory is capable of being pressed into smooth, hard sheets or molded shapes of dense and uniform structure. It is believed that material can be produced from sawdust that will meet demands for a plastic of wide utility and low cost. Further experimental work to this end is under way.